

IGS and the Education of the Next Generation of Users ...

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Overview

- ◆ Should the IGS be concerned with education?
- ◆ IGS and “Geodesy Education”
- ◆ Educating the next generation of users
- ◆ Concluding remarks

Opinions & views are those of the author, and are not endorsed by the IGS GB!



Educational Activities to Date

- ◆ Not *explicitly* mentioned in “Mission” of IGS.
- ◆ Individuals & organisations associated with the IGS have undertaken variety of “educational activities” ... *mostly through workshops & publications.*
- ◆ IGS-university links support advanced *education.*
- ◆ IGS-agency links support advanced *training.*
- ◆ IGS “educational activities” linked to *geodesy & broader geosciences.*



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Mission (New) of IGS

“The IGS is committed to providing the highest quality data and products as the standard for GNSS in support of Earth science research, multidisciplinary applications, and education.

These activities aim to advance scientific understanding of the Earth system components and their interactions, as well as to facilitate other applications benefiting society.”

Long-Term Goals & Objectives of IGS (SP 2002-2007)

1. ...
2. Promote universal acceptance of IGS products & conventions as the world standard.
3. Continuously innovate by attracting leading-edge expertise & pursuing challenging projects & ideas.
4. Seek and implement new growth opportunities while responding to new user needs.
5. ...
6. ...



Strategy 1: Ensure delivery of “world-standard” GPS (& other GNSS) data & products, providing the standards & specifications globally.

1. Maintain & improve ... GPS/GNSS data, products, ...
2. Promote IGS data, methods & products to current & potential users as a “world” standard, and broaden the IGS user community into other areas.

Develop broader outreach & education ...

Build partnerships ...

Expand participation ...

3. Attract leading-edge talent for continuous innovation.

Embrace new & innovative project proposals ...



IGS & Educational Activities in the Future

- ◆ ***Education, outreach & engagement*** strategies needed to realise updated “Mission” of IGS.
- ◆ **Issues:**
 - Little IGS “branded” education in the past.
 - “Traditional” user communities (geodesy & geoscience) had opportunities for adopting IGS products & methods.
 - New user communities (navigation, telematics, etc.) largely ignorant of the fundamental role of IGS products & services.
 - New products & services could be developed largely without formal IGS involvement.

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Geodesy Education & the IGS

- ◆ University courses ... *education of undergrads/postgrads.*
- ◆ **Graduate student “advanced training”** ... *campaigns & projects using IGS data & products; generally at universities in developed countries.*
- ◆ **Agency personnel “advanced training”** ... *methodologies for geodetic / geoscientific projects; on an adhoc basis (once-off for datum redefinition, continuous if IGS data centre, etc.).*
- ◆ Hardly any “IGS-level” reference books or monographs (*IGS reports only suitable for researchers*).
- ◆ Few “IGS-level” workshops, conferences or seminars.

“GPS Geodesy” Workshops

- ◆ 1st Int. School “**GPS for Geodesy**”, 26 March-1 April ‘95, Delft, The Netherlands... *2nd School 2-8 March ‘97.*
- ◆ “**GPS for Geodesy**” ... *2nd ed., 1998, Teunissen & Kleusberg (Eds.); no longer available at Amazon.com.*
- ◆ 1st “**Tropical School of Geodesy**”, 18-29 October ‘93, Bandung, Indonesia... *2nd School 4-16 November ‘96.*
- ◆ Miscellaneous, regional workshop activities, *e.g. South Pacific, Africa, South America, Asia, with speakers that have IGS knowledge or experience ... however little or no IGS “branding”.*
- ◆ IGS “outreach” activities, *e.g. ION, IUGG, WPGM, CGSIC, UN, etc.*

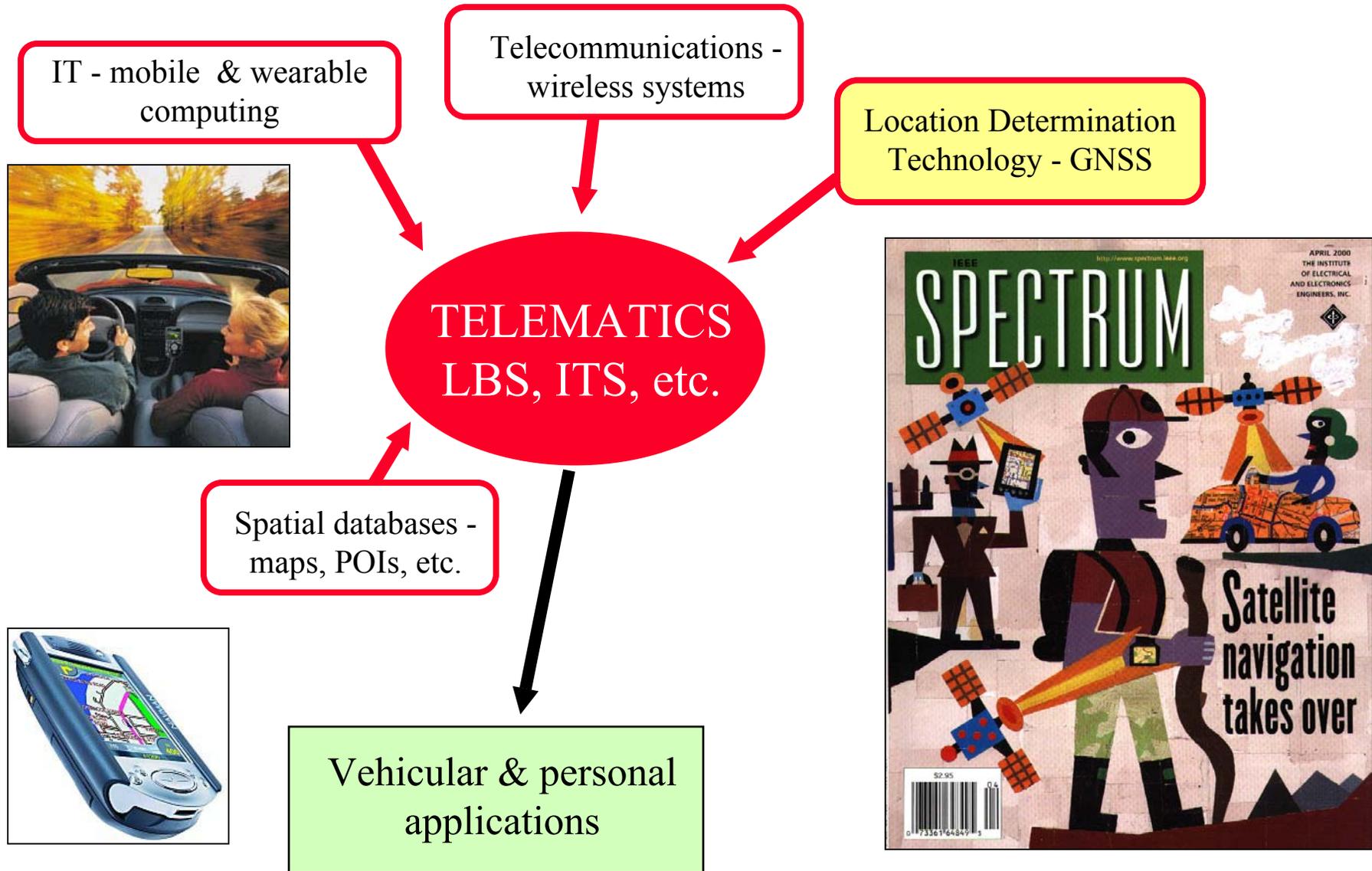


Disturbing Impressions

1. “GPS Geodesy” is but a small user community ...
2. Unable to influence Galileo (Glonass? SBAS?) signal definition ...
3. No recent “GPS Geodesy” educational activities
 - *IGS & lesser-developed countries?*
 - *Up-to-date university materials?*
4. Little (no?) IGS-level education activities/materials for non-geodesy user communities
 - *Agencies (national, RTCM, ICAO, IALA, etc.) increasingly developing user/service provider “stds & specs”.*
 - *Professional societies (national & international) can/do fill “gap”.*
 - *Comercial interests promote products & services.*
 - *Scientific societies (e.g. IAG) have some activities at SC/WG level.*



GNSS Mega-Trends



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“The Next Generation of Users”

- ◆ Precise navigation/guidance/control, surveyors & engineers, non-positioning, developers of Telematics products & services, ...
- ◆ GNSS is but a tool, an enabling technology ... *little/no appreciation of “fundamentals” (reference frames, etc.) or nature of performance “constraints” (biases & errors, RT ops).*
- ◆ Training/education needs are met in a variety of ways ... *books, short courses (e.g. Navtech Seminars), symposia,...*
- ◆ Increasing recognition by professional/scientific bodies of opportunities to “reach” next generation users ... *IAG, IONs, FIG, UN GNSS Action Team, etc.*
- ◆ Often difficult to distinguish between: ***education, outreach & engagement.***
- ◆ ***What should the IGS do?***

Education Strategies?

IGS needs to develop education strategies ... *e.g. what IGS products &/or services are of greatest interest/benefit to “traditional” and “non-traditional” users?*

- ◆ Resurrect Int. School “GPS for Geodesy” ... *regional workshops? update textbook? promote IGS methods, products & services to “traditional” users? Involvement of IAG Outreach Branch?*
- ◆ Launch education initiatives targetting new “non-traditional” users:
 - *with FIG for surveyors & engineers ... new/hybrid GNSS techs, network-RT, CORS networks, 3D & 4D spatial frames (SDI, etc.) ...*
 - *with IONs (incl. Navtech?) for professional navigators ... mix GPS & Galileo, RT ops, WADGPS, SBAS/GBAS, multi-sensor systems ...*
 - *with IEEE for Telematics system developers ... spatial frameworks, CORS & A-GNSS, multi-sensor systems ...*
 - *Etc.*



Concluding Remarks

- ◆ IGS does OK in the areas of “outreach” and “engagement”.
- ◆ IGS has never had an explicit “education” policy.
- ◆ “GPS for Geodesy” education has stalled ... *is there no longer any need for it?*
- ◆ IGS should reconsider its mission with respect to education ... *for both “traditional” and “non-traditional” users.*
- ◆ If IGS is serious about developing an education policy for “next generation users”, *it should convene a workshop/WG to examine strategies/options.*
- ◆ If IGS (speculative!) decides that education *is* an important function, *on par* with research activities and geodetic operations, *should there be an appropriate “IGS component” established?*

IAG/IAPSO 2005 Scientific Assemblies

Cairns, Australia, 22-26 August

IGS's participation: outreach,
research findings, strategic planning?